

ABSTRACT:**EVANESCENT WAVE SENSING APPARATUS AND METHODS USING PLASMONS**

This invention is generally concerned with sensing apparatus, methods and techniques based upon cavity ring-down spectroscopy (CRDS), in particular evanescent-wave based cavity ring-down plasmon resonance techniques.

An evanescent wave cavity-based optical sensor is described. The sensor comprises an optical cavity formed by a pair of highly reflective surfaces such that light within said cavity makes a plurality of passes between said surfaces, an optical path between said surfaces including a reflection from a totally internally reflecting (TIR) surface, said reflection from said TIR surface generating an evanescent wave to provide a sensing function; a light source to inject light into said cavity; and a detector to detect a light level within said cavity; and wherein said TIR surface is provided with an electrically conducting material over at least part of said TIR surface such that said evanescent wave excites a plasmon within said material; whereby a change in absorption of said evanescent wave due to a change in said plasmon excitation is detectable using said detector to provide said sensing function.

Figure 1c